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SEAL DURABILITY STUDY GROUP FOR ITEMS "B" AND "C" FROM PANEL DISCUSSIONS

This report is to provide a summary and outline of information discussed by a special panel of individuals associated with the seal durability of insulating glass units (IGU). This panel was selected from a group that had previously met in Cincinnati to discuss the subject. An August 13, 2001 report will give reference to the information discussed during the full panel discussion. Volunteers to undertake the task of reviewing Items B and C that are listed in the August 13th report formed this special task group.

A meeting was held on Friday August 17th in LaMalbaie, Quebec, Canada. Those in attendance at this meeting were:

Hakim Elmahdy, IRC/NRC of Canada
Andre Piers, TNO Institute of Applied Physics, The Netherlands,
Jim Fairman, Aspen Research Corporation
Bill Lingnell, *LINGNELL CONSULTING SERVICES*
Andre Piers, TNO Institute of Applied Physics, The Netherlands
Lori Postak, TruSeal Technologies
Bob Spindler, Cardinal IG
Carl Wagus, American Architectural Manufacturers Association

The two major items the group was asked to explore and provide guidance on for developing a work statement and begin work on a flow chart for the project requirements are as follows:

Item B – Support the concept to fund research and development to:

a. develop new testing protocols for IG use and system effects that result in failure/performance that can be correlated with failures/performance encountered from inservice use

b. purchase two chambers for evaluating the merits of P1 and P2 testing and the newly devised protocols

c. lead a task for consolidating all the variations in accelerated and real time testing into one protocol, and have it balloted to be an ASTM Standard

d. identify other related activities

Item C – Fund independent and other laboratories with in-depth experience with insulating glass unit (IGU) testing to:

a. assess the durability of IGUs

b. develop a peer-reviewed plan for predicating service lifetimes

c. implement the plan

The entire group was updated on current activities with regard to industry work on seal durability. Aspen Research indicated that they are now involved in a two-year program to develop an IG knowledge base along with other areas that will relate to seal durability. General comments during the discussion related to the fact that many old ratings do not always tell the story about glass with high performance characteristics or frame/slash components for overall durability and serviceability during the lifetime of an IGU. It was indicated that a need for reliable data from IG manufacturers for long term durability exists, and it may require a field survey to obtain this information.

The identification of major areas relating to Item B was listed to continue with the efforts required in setting forth the work plan. The environmental conditions identified as critical to the durability of an IGU and system are listed as follows:

Temperature	Load (compression)
Ultraviolet Exposure	Co-efficient of expansion (IG)
Humidity	Co-efficient of expansion (frame)
Water spray	Constant stress
Load (tension)	Speed (length of test)
Load (shear)	

Also identified as areas needing to receive special attention are; enhanced component testing as an adjunct to current IG assembly testing, and compatibility testing/evaluation. Also it was felt that compatibility testing and evaluations were extremely important on various materials that are known to react or provide undesirable conditions for other materials in the overall IGU/frame/sash/ components assembly of the overall system.

The next item is a basic work statement of the major parts that would accomplish the study and requirements of Item B. They are listed as items B-1 through B-9 and a timeline was also established which will be presented later in the report.

A study of longevity, durability, and maintenance of long-term energy efficiency along with solar and daylighting control by accomplishing the following:

B-1. Study and/or test compatibility of IG sealants with glazing materials, i.e., other sealants, spacer materials, etc.

B-2. Study interface between IGUs and framing, i.e., imposed loads, exposure to water (should we study IG in isolation or as part of an assembly?). Review existing glazing guidelines and methods

B-3. Study effects of variations in sealant composition

B-4. Study and test (validate) effect of relevancy of non-typical and typical environments ex. – hot-humid-salty, hot-dry, industrial, arctic-cold-dry, manufactured unit vs. installed unit, and SO_2-polluted conditions.

B-5. Investigate the effect of loading and induced stresses both in the IGU and in the assembly (i.e., wind, thermal, glazing forces, window movement/operation, etc.)

B-6. Identification of modes and mechanisms of failure by actual unit testing and analysis. (failure mode effect analysis-FMEA) Identify manufacturing anomalies, deficiencies, or design inadequacies to determine if they caused failure mechanisms.

B-7. Identify and/or purchase necessary equipment to evaluate existing and newly proposed test evaluation protocols.

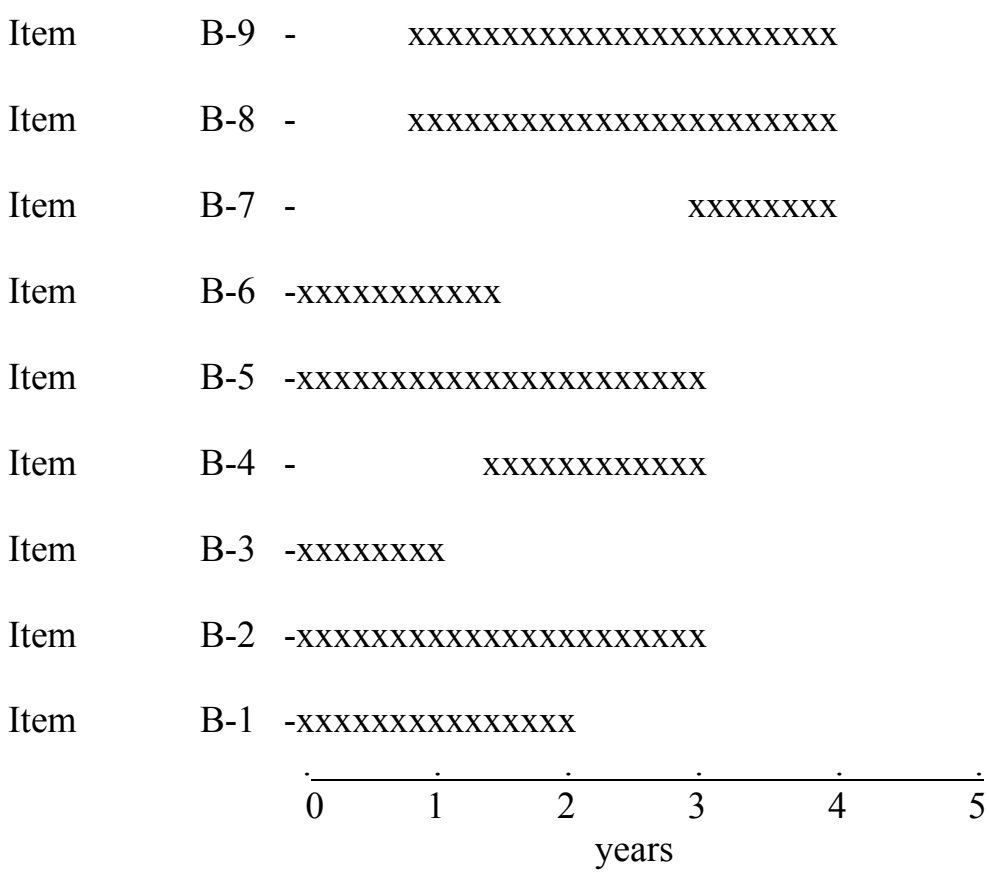
B-8. The "ASTM standards process"(referenced in minutes) is to be revised to read a "consensus review process", which may include ASTM or other standards groups that can be invited to work with the process of having the testing developed into one protocol and balloted to a standard.

B-9. Study and identify other activities to IGU/frame/sash durability that relate to the overall seal durability of the IGU. B-1 through B-9 represent the work statements that are required to accomplish the Item B with items B-1 through B-6 representing Part A, B-7 part B, B-8, Part C, and B-9 Part D. See page 5 of this report for a time line example and item relationship for the "B" items

After discussion of the items contained in Item C, it was determined that the IG knowledge base proposal, which has been granted to Aspen Laboratories will accomplish the statement with regard to Item C as listed in the August 13, 2001 report. This will include the major emphasis on gathering information on durability and service lifetime predictions of IGUs and testing.

The following is the relationship and a timeline of the "B" items:

Time Line of "B" Items



Item	Length	Prerequisite
B-1	2 yrs	None
B-2	3 yrs	None
B-3	1 yr	None
B-4	1.5 yrs	B-6
B-5	3.0 yrs	None
B-6	1.5 yrs	None
B-7	1 yr	B-1 thru B-6
B-8	Continuous after one year	
B-9	Continuous after one year	

Respectfully Submitted,

A. William Lingnell, P.E.
Consultant